HARP Update
“First” Glimpse of Thick Target Data

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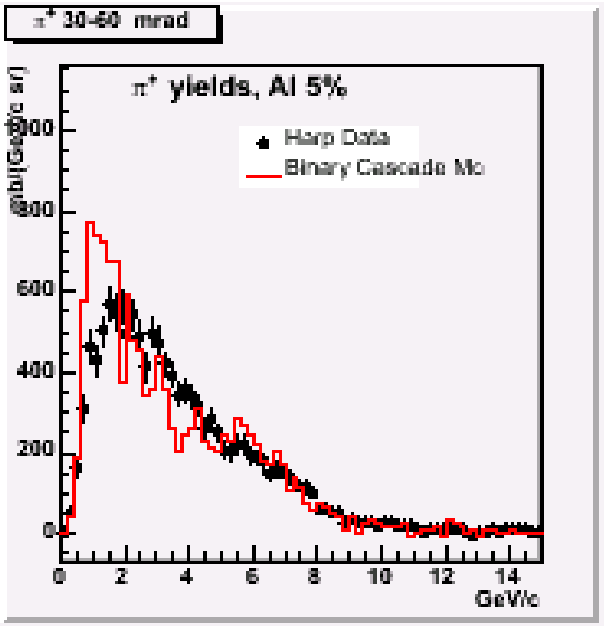
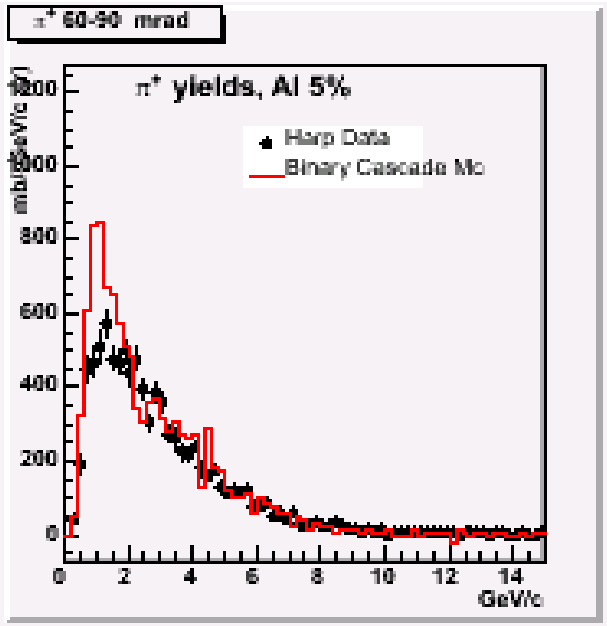
Thick Targets:

- The goal is to understand underlying physics processes in order to enable accurate MC simulation
- Two MC's :
  - HARP simulation (currently Geant4 Binary Cascade)
  - MiniBooNE Beam MC (Geant4 based)
- Best approach? Some combination of:
  - Comparing secondary yields HARP data vs HARP MC
  - Comparing HARP cross section measurements with MiniBooNE Beam MC physics models

Particle yields: (preliminary)

- In this analysis a selection of particles is made based on HARP tracking and PID detectors (TOF, Cerenkov, Calorimeter)
- Incoming particle is selected via beam instrumentation
- The next plots show, in units of mb/(GeV/c)/str, particle yields from the various Harp targets
- The MC is full HARP simulation with the Binary Cascade model used for both primary and secondary interactions


π+ 30-60 mrad
π+ yields, Al 5%
Harp Data
Binary Cascade Mc
mb/(GeV/c sr)
GeV/c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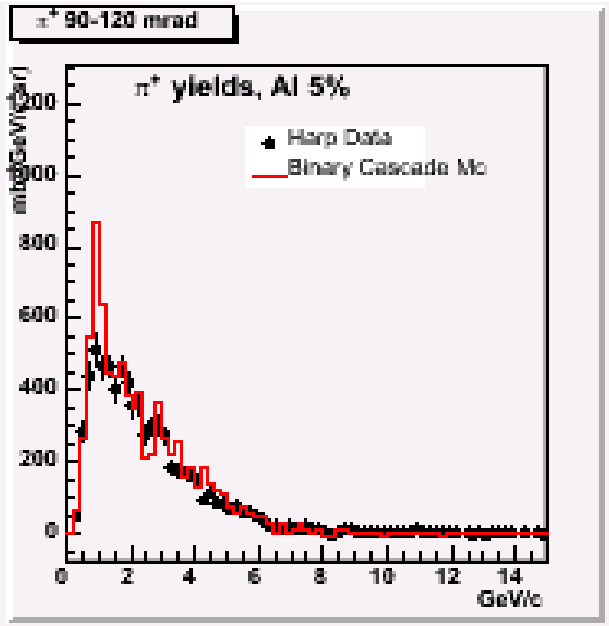
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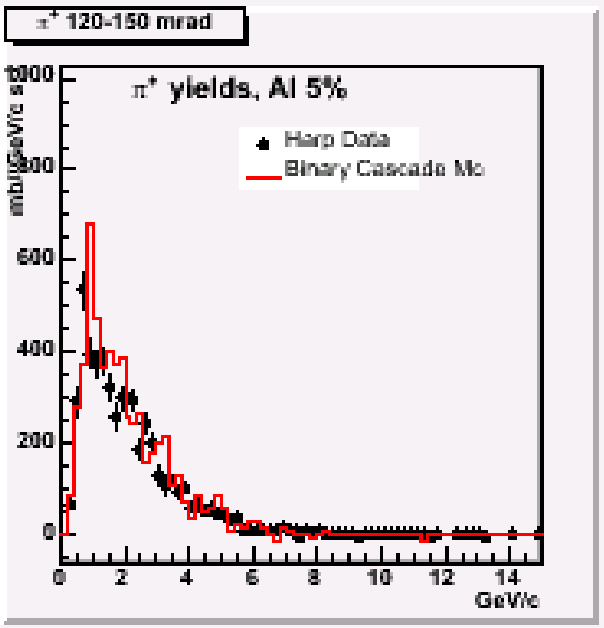
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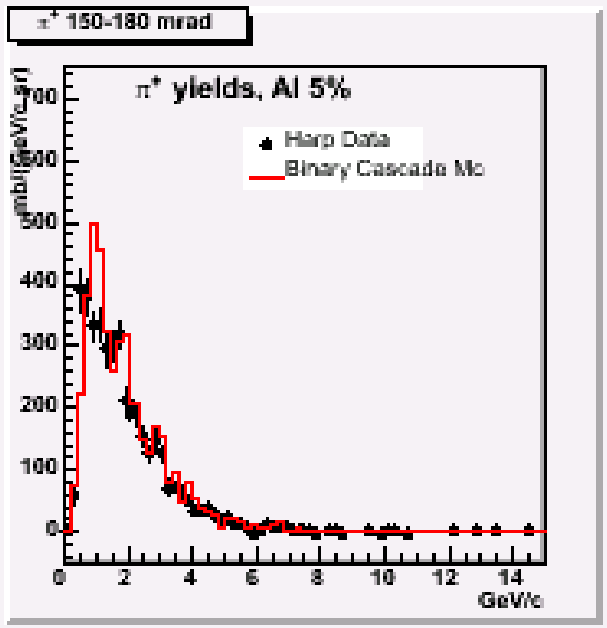
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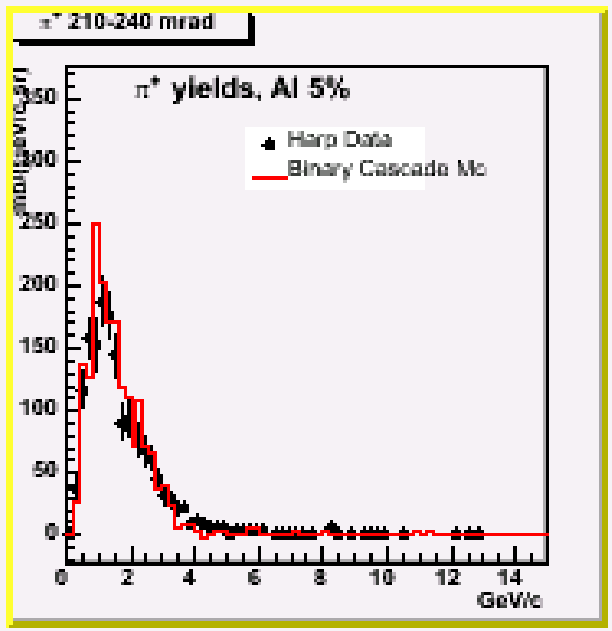
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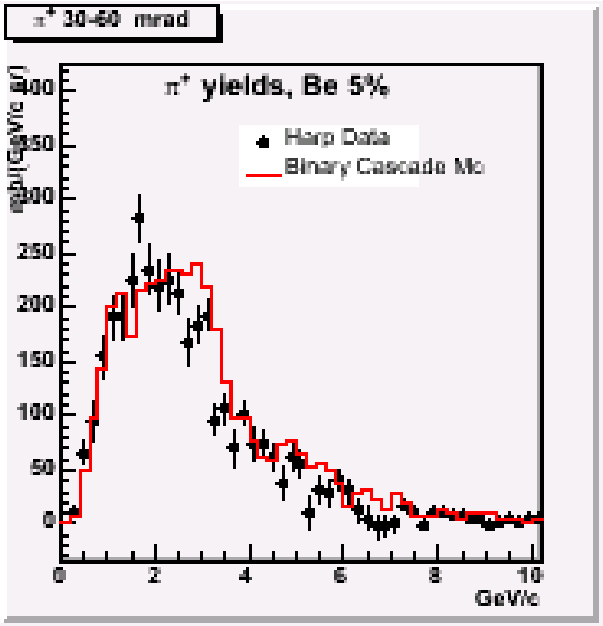
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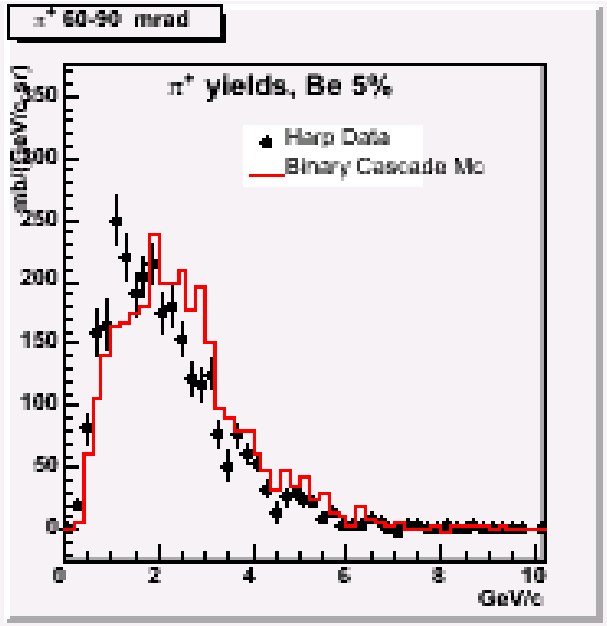
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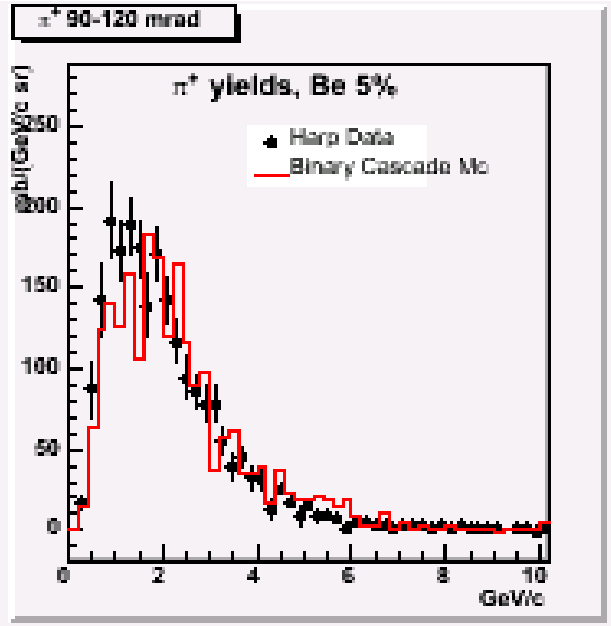
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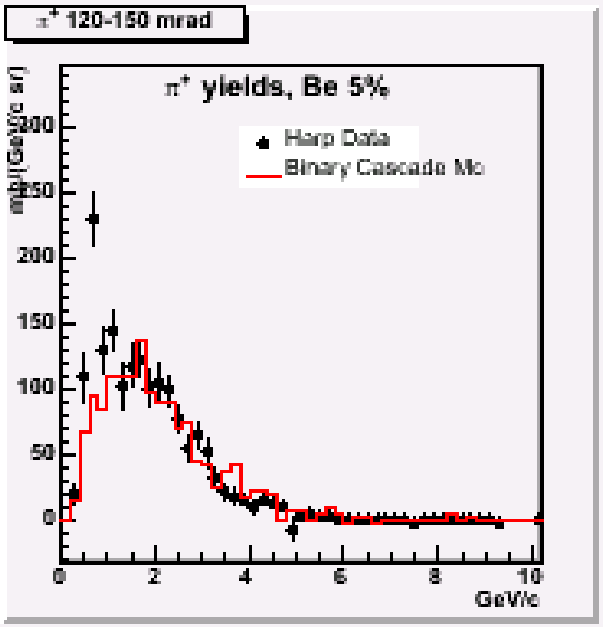
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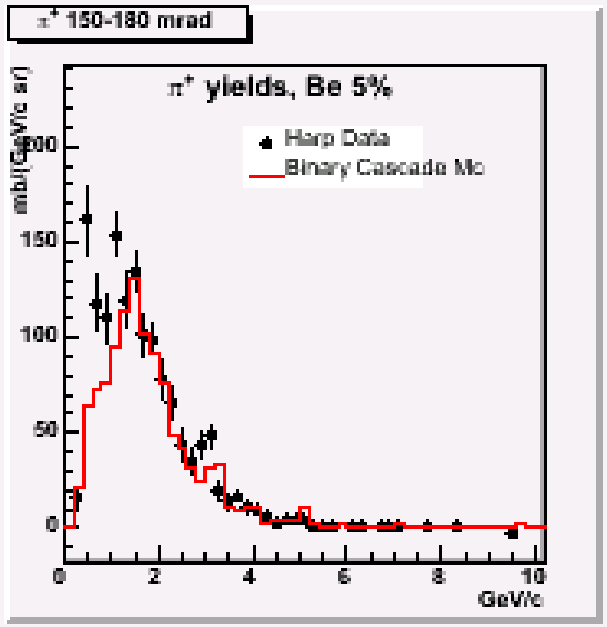
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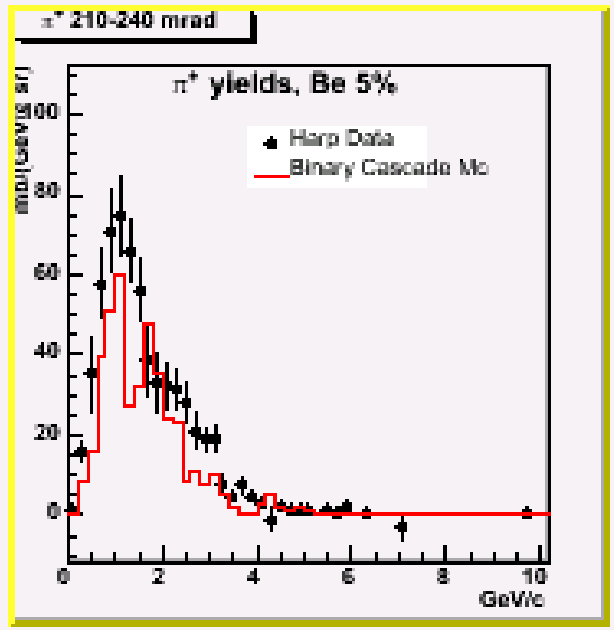
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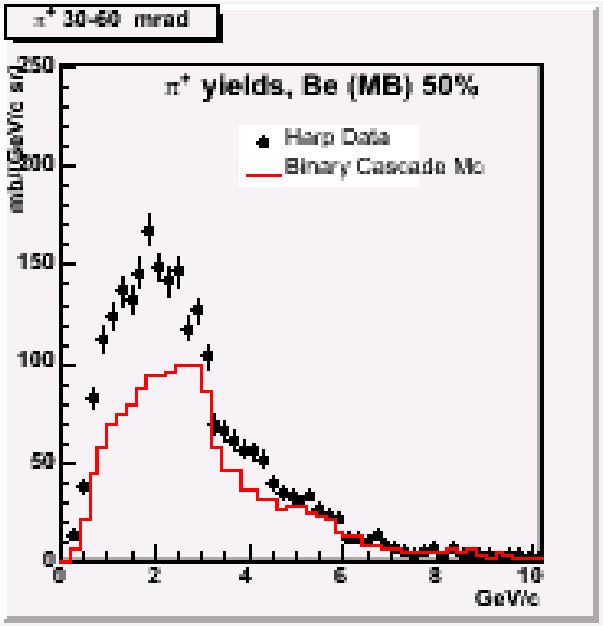
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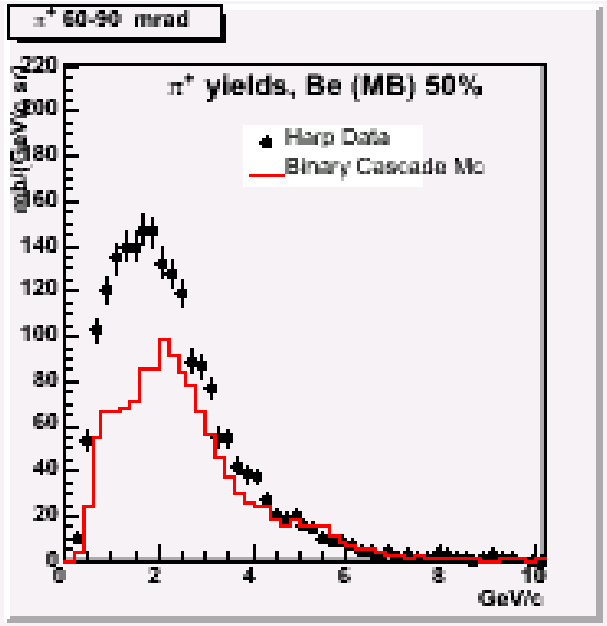
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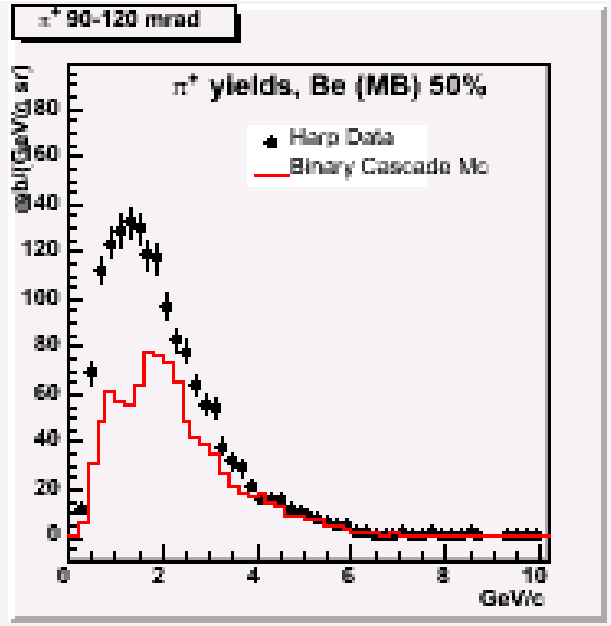
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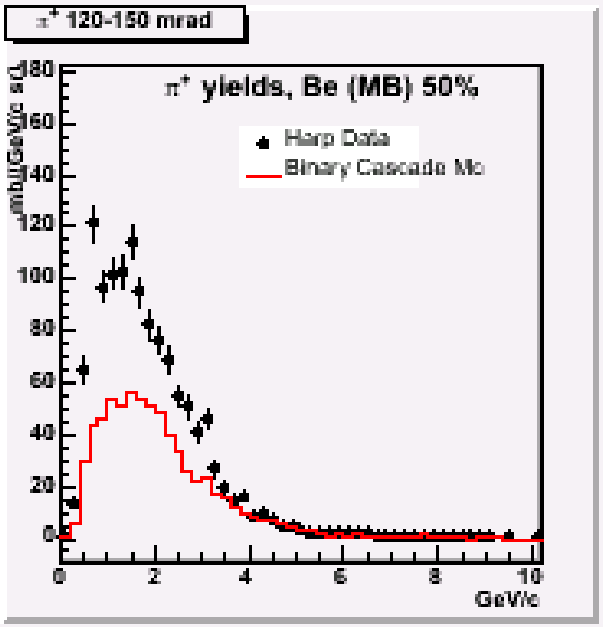
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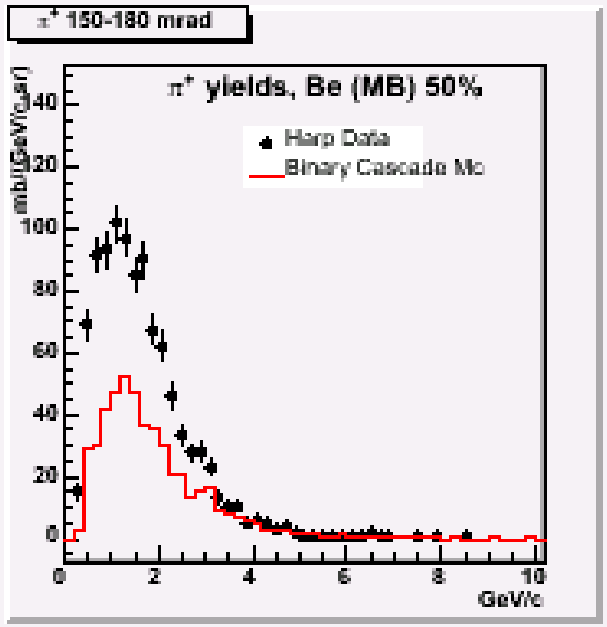
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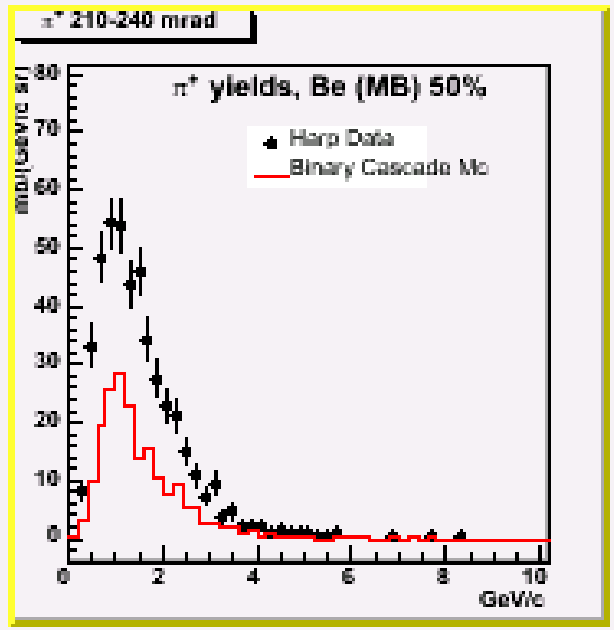
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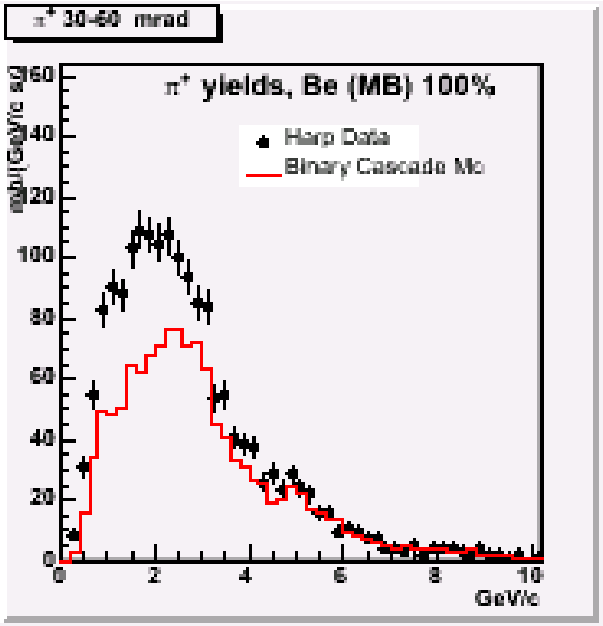
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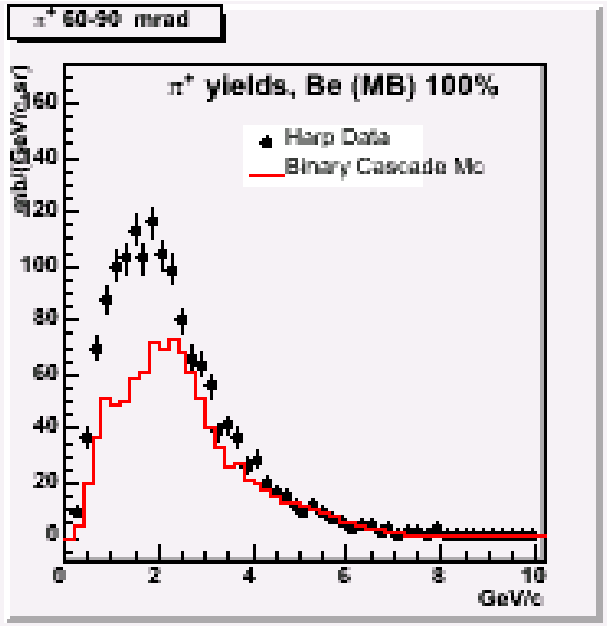
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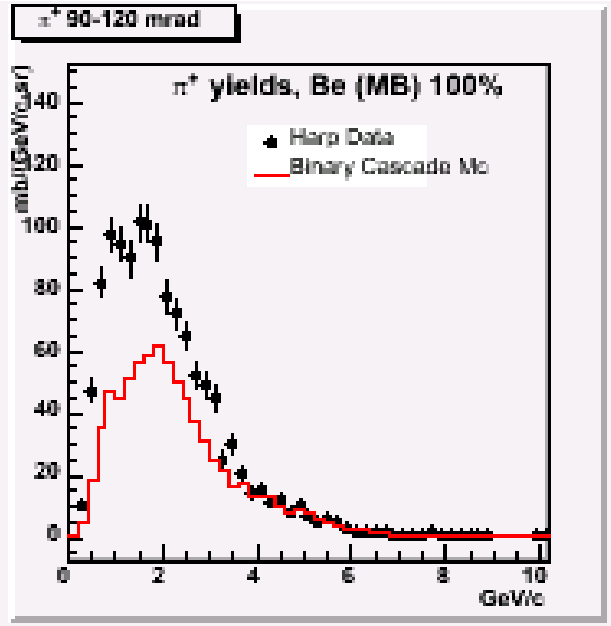
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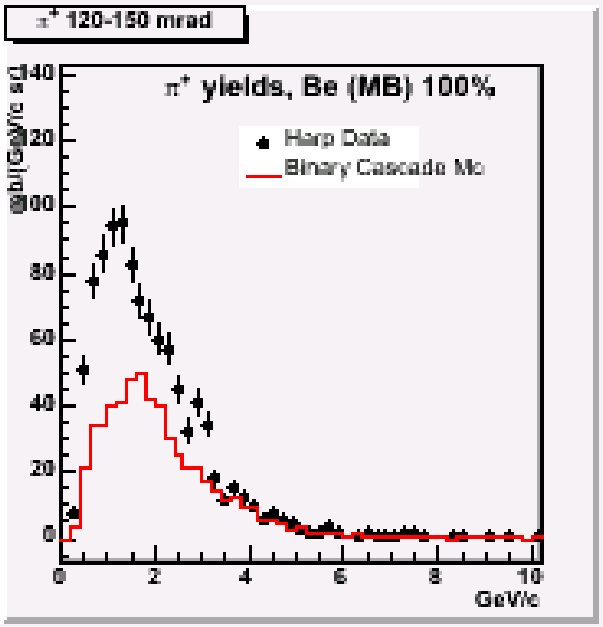
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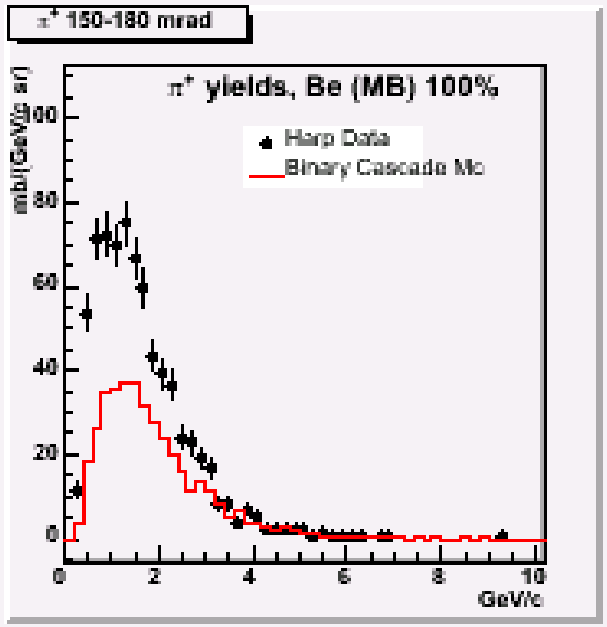
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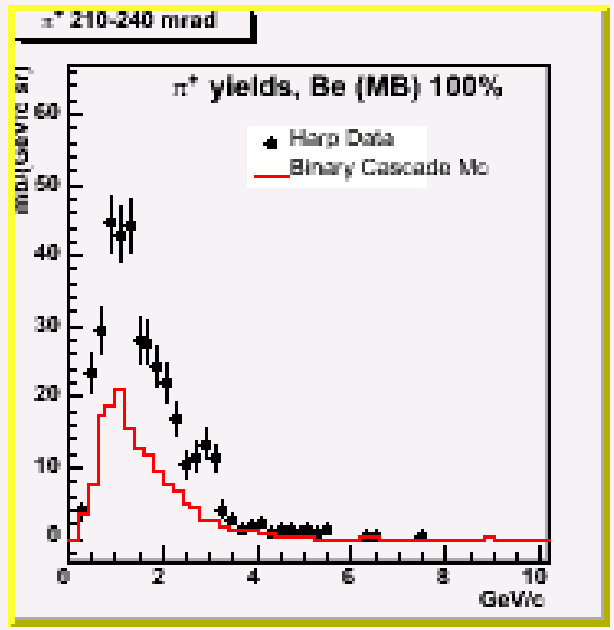
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Conclusions

- “Out of the box” Geant4 binary cascade model seems to predict thin target data, Be and Al
- Serious problem in Harp MC/analysis to predict thick target data
- Expect to understand this difference (bug in analysis, Harp MC?) on the time scale of a month